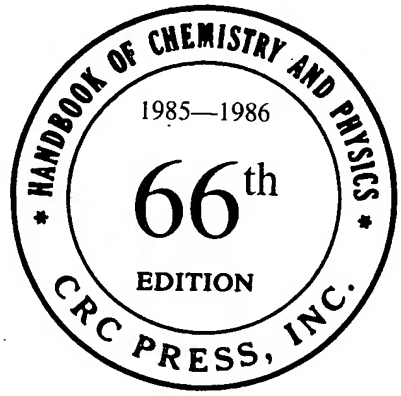
CRC Handbook of Chemistry and Physics

A Ready-Reference Book of Chemical and Physical Data



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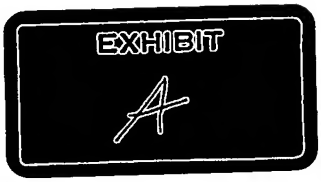

INDEX OF REFRACTION

Indices of refraction for elements, inorganic, metal-organic and organic compounds and minerals will be found in the tables of physical constants for the various classes of substances in the section Properties and Physical Constants.

Values for compounds not there listed and data subsequently collected are given below.

Indices not otherwise indicated are for sodium light, λ = 589.3 mμ. Other wave lengths are indicated by the value in millimicrons or symbol in parentheses which follows the index. Wave lengths are indicated as follows: He, λ = 587.6 mμ; Li, λ = 670.8 mμ; Hg, λ = 579.1 mμ; A, λ = 759.4 mμ; C, λ = 656.3 mμ; D, λ = 589.3 mμ; F, λ = 486.1 mμ.

Temperatures are understood to be 20°C for liquids, or ordinary room temperatures in the case of solids. Other temperatures appear as superior figures with the index.

Indices for the elements and inorganic compounds will be understood to be for the solid form except as indicated by the abbreviation liq.

See also under Physical Constants of Inorganic Compounds and index of Refraction of Gases.

Elements

Name	Formula	Index
Bromine (liq.)	Br_2	1.661_{18}
Cadmium (liq.)	Cd	0.82 (579 mμ)
(sol.)		1.13
Chlorine (liq.)	Cl_2	1.385
(gas)		1.00768
Hydrogen (liq.)	H_2	$1.10974^{-252.83}$(579 mμ)
Iodine (sol.)	I_2	3.34
(gas)		1.001920
Lead	Pb	2.6 (579 mμ)
Mercury (liq.)	Hg	1.6-1.9
Nitrogen (liq.)	N_2	1.2053^{-190}
Oxygen (liq.)	O_2	1.221^{-131}
Phosphorous (yel.) (sol.)		2.1442^{25}
Selenium	Ses	3.00, 4.04
(amor.) (sol.)		2.92
Sodium (liq.)	Na	0.0045
(sol.)		4.22
Sulfur (liq.)	S_α	1.929^{110}
(amor.) (sol.)		.1998
(rhombic, α)		1.957, 2.0377, 2,2454
Tin (liq.)	Sn	2.1

Inorganic Compounds

See also under Physical Constants of Inorganic Compounds

Name	Formula	Index
Aluminum carbide	AlC_3	2.7, 2.75 (700 mμ)
chloride	$AlCl_3 \cdot 6H_2O$	1.560, 1,507
oxide	Al_2O_3	1.665-1.680, 1.63-1.65
Alums. See under appropriate element.		
Ammonium antimony tartrate	$2(NH_4 \cdot SbO \cdot C_4H_4O_4)H_2O$	β1.6229 (C)
*ortho*arsenate, di-H	$NH_4H_2AsO_4$	1.5766, 1.5217
bromide	NH_4Br	1.7108
*per*chlorate	NH_4ClO_4	1.4818, 1.4833, 1.4881
chloroplatinate	$(NH_4)_2PtCl_6$	1.8
fluoride	NH_4F	ω<1.328
acid	NH_4HF_2	1.385, 1.390, 1.394
hydrogen malate (*d*)	$NH_4C_4H_5O_5$	β1.503
nitrate	NH_4NO_3	1.413, 1.611(He), 1.63
Ammonium sulfate, acid	NH_4HSO_4	1.463, 1.473, 1.510
tartrate (*dl*)	$(NH_4)_2C_4H_4O_6 \cdot 2H_2O$	β1.564
thiocyanate	NH_4CNS	1.546, 1.685, 1.692
uranyl acetate	$NH_4C_2H_3O_2 \cdot UO_2(C_2H_3O_2)_2$	1.4808, 1.4933
Antimony bromide	$SbBr_3$	>1.74+
iodide, tri-	SbI_3	2.78 (Li), 2.36
Barium cadmium bromide	$BaCdBr_4 \cdot 4H_2O$	β1.702
cadmium chloride	$BaCdCl_4 \cdot 4H_2O$	β1.651
calcium propionate	$BaCa_2(C_3H_5O_2)_6$	1.4442
fluochloride	$BaCl_2 \cdot BaF_2$	1.640, 1.633
fluoride	BaF_2	1.475 also 1.4741
Barium oxide	BaO	1.980
*ortho*phosphate, di-	$BaHPO_4$	1.617, 1.63±, 1.635
propionate	$Ba(C_2H_5CO_2)_2 \cdot H_2O$	β1.5175
sulfide, mono-	BaS	2.155
Cadmium ammonium chloride	$CdCl_2 \cdot 4NH_4Cl$	1.6038, 1.6042
cesium sulfate	$CdSO_4 \cdot Cs_2SO_4 \cdot 6H_2O$	1.498, 1.500, 1.506
fluoride	CdF_2	1.56
magnesium chloride	$(CdCl_2)_3 \cdot MgCl_2 \cdot 12H_2O$	1.49, 1.5331, 1.5769
oxide	CdO	2.49 (Li)
potassium chloride	$CdCl_2 \cdot 4KCl$	1.5906, 1.5907
cyanide	$Cd(CN)_2 \cdot 2KCN$	1.4213
rubidium sulfate	$CdSO_4 \cdot Rb_2SO_4 \cdot 6H_2O$	1.4798, 1.4848, 1.4948
Calcium aluminate	$Ca_3Al_2O_6$	1.710
borate	$CaO \cdot B_2O_3$	1.540, 1.656, 1.682
carbide	CaC_2	<1.75
copper acetate	$CaCu(C_2H_3O_2)_4 \cdot 6H_2O$	1.436, 1.478
cyanamide	$CaCN_2$	1.60, <1.95
dithionate	$CaS_2O_6 \cdot 4H_2O$	1.5516, 1.5414
*pyro*phosphate	$Ca_2P_2O_7$	1.585, 1.60±, 1.605
platinocyanide	$CaPt(CN)_4 \cdot 5H_2O$	1.623, 1.644, 1.767
stromtium propionate	$Ca_2Sr(C_3H_5O_2)_6$	1.4871, 1.4956
sulfide (oldhamite)	CaS	2.137
sulfite	$CaSO_3 \cdot 2H_2O$	1.590, 1.595, 1.628
thiosulfate	$CaS_2O_3 \cdot 6H_2O$	1.545, 1.560, 1.605
Carbon dioxide (liq.)	CO_2	1.195^{15}
Cerium dithionate	$Ce_2(S_2O_6)_3 \cdot 15H_2O$	β1.507
Cesium *per*chlorate	$CsClO_4$	1.4752, 1.4788, 1.4804
nitrate	$CsNO_3$	1.55, 1.56
selenate	Cs_2SeO_4	1.5989, 1.5999, 1.6003
thallium chloride	$Cs_2Tl_2Cl_6$	1.784, 1.774
Chromium cesium sulfate	$CrCs(SO_4)_2 \cdot 12H_2O$	1.4810
oxide (ic)	Cr_2O_3	2.5
potassium cyanide (ic)	$CrK_3(CN)_6$	4.5221, 1.5244, 1.5373
sulfate (ic)	$Cr_2(SO_4)_3 \cdot 18H_2O$	1.564
thallium sulfate	$CrTl(SO_4)_2 \cdot 12H_2O$	1.5228
Cobalt acetate	$Co(C_2H_3O_2)_2 \cdot 4H_2O$	β1.542
aluminate (Thenard's Blue)	$Co(AlO_2)_2$	<1.78 (red), 1.74 (blue)
ammonium selenate	$CoSeO_4 \cdot (NH_4)_2SeO_4 \cdot 6H_2O$	1.5246, 1.5311, 1.5396
cesium sulfate	$CoCs_2(SO_4)_2 \cdot 6H_2O$	1.5057, 5.5085, 1.5132
chloride (ous)	$CoCl_2 \cdot 2H_2O$	<1.624, <1.671, >1.67
potassium selenate	$CoSeO_4 \cdot K_2SeO_4 \cdot 6H_2O$	1.5135, 1.5195, 1.5358
rubidium sulfate	$CoSO_4 \cdot Rb_2SO_4 \cdot 6H_2O$	1.4859, 1.4916, 1.5014
selenate	$CoSeO_4 \cdot 6H_2O$	α1.5225, γ1.5227
Copper ammonium selenate	$CuSeO_4 \cdot (NH_4)_2SeO_4 \cdot 6H_2O$	1.5213, 1.5355, 1.5395
ammonium sulfate	$CuSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$	1.4910, 1.5007, 1.5054
cesium sulfate	$CuSO_4 \cdot Cs_2SO_4 \cdot 6H_2O$	1.5048, 1.5061, 1.5153
chloride (ic)	$CuCl_2 \cdot 2H_2O$	1.644, 1.684, 1.742
formate	$Cu(CHO_2)_2 4H_2O$	1.4133, 1.5423, 1.5571
Copper oxide (ous) (cuprite)	Cu_2O	2.705
potassium chloride	$CuCl_2 \cdot 2KCl \cdot 2H_2O$	1.6365, 1.6148
potassium cyanide (ous)	$CuK_3(CN)_4$	1.5215
potassium selenate	$CuSeO_4 \cdot K_2SeO_4 \cdot 6H_2O$	1.5096, 1.5235, 1.5387
potassium sulfate	$CuSO_4K_2SO_4 \cdot 6H_2O$	1.4836, 1.4864, 1.5020
strontium formate	$Cu(HCO_2)_2 \cdot 2[SrHCO_2)_2]$ $8H_2O$	1.4995, 1.5199, 1.5801
sulfate (ic)	$CuSO_4$	1.724, 1.733, 1.739
Cyanogen	C_2N_2	1.327^{18} (liq.)
Germanium bromide, tetra-	$GeBr_4$	1.6269
Gold sodium chloride	$AuNaCl_4 \cdot 2H_2O$	α1.545, γ1.75+
Hafnium oxychloride	$HfOCl_2 \cdot 8H_2O$	1.557, 1.543
Ice	H_2O	1.3049, 1.3062 (A), 1.3001, 1.3104 (D), 1.3133, 1.3147 (F)
Iron ammonium chloride	$Fe(NH_4)_2Cl_4$	1.6439
ammonium selenate	$FeSeO_4 \cdot (NH_4)_2SeO_4 \cdot 6H_2O$	1.5201, 1.5260, 1.5356
cesium sulfate (ic)	$FeCs(SO_4)_2 \cdot 12H_2O$	1.4839
cesium sulfate (ous)	$FeSO_4 \cdot Cs_2SO_4 \cdot 6H_2O$	1.5003, 1.5035, 1.5094
rubidium sulfate	$FeRb(SO_4)_2 \cdot 12H_2O$	1.48234
sulfate (ic)	$Fe_2(SO_4)_3$	1.802, 1.814, 1.818
thallium sulfate	$FeTl(SO_4)_2 \cdot 12H_2O$	1.52365
Lanthanum sulfate	$La_2(SO_4)_3 \cdot 9H_2O$	1.564, 1.569
Lead *ortho*arsenate, di-	$PbHAsO_4$	1.8903, 1.9097, 1.9765
nitrate	$Pb(NO_3)_2$	1.782
Lithium ammonium sulfate	$LiNH_4SO_4$	β1.437 (Li)
ammonium tartrate (*d*)	$LiNH_4(C_4H_4O_6) \cdot H_2O$	β1.567, γ1.5673
ammonium tartrate (*dl*)	$LiNH_4(C_4H_4O_6) \cdot H_2O$	β1.5287
bromide	LiBr	1.784
chloride	LiCl	1.662
dithionate	$Li_2S_2O_6 \cdot H_2O$	1.5487, 1.5602, 1.5788
oxide	Li_2O	1.644
potassium sulfate	$LiKSO_4$	1.4723, 1.4717
potassium tartrate	$LiK(C_4H_4O_6) \cdot H_2O$	β1.5226 (red)
rubidium tartrate (*a*)	$LiRb(C_4H_4O_6) \cdot H_2O$	β1.552
sodium tartrate (*dl*)	$LiNa(C_4H_4O_6) \cdot 2H_2O$	β1.4904
Magnesium ammonium selenate	$MgSeO_4 \cdot (NH_4)_2SeO_4 \cdot 6H_2O$	1.5070, 1.5093, 1.5169
ammonium sulfate	$Mg(NH_4)_2 \cdot (SO_4)_2 \cdot 6H_2O$	1.4716, 1.4730, 1.4786
*ortho*borate	$3MgO \cdot B_2O_3$	1.6527, 1.6537, 1.6748
cesium sulfate	$MgCs_2(SO_4)_2 \cdot 6H_2O$	1.4857, 1.4858, 1.4916
chlorostannate	$MgSnCl_6 \cdot 6H_2O$	1.5885, 1.5970
fluosilicate	$MgSiF_6 \cdot 6H_2O$	1.3439, 1.3602
platinocyanide	$MgPt(CN)_4 \cdot 7H_2O$	1.5608, 1.91
Magnesium potassium selenate	$MgK_2(SeO_4)_2 \cdot 6H_2O$	1.4969, 1.4991, 1.5139
potassium sulfate	$MgK_2(SO_4)_2 \cdot 6H_2O$	1.407, 1.4629, 1.4755
rubidium sulfate	$MgRb_2(SO_4)_2 \cdot 6Hi2O$	1.4672, 1.4689, 1.4779
silicate	$MgSiO_3$	1.651, 1.654 (calc.), 1.660
sulfide	MgS	2.271 also 2.268
Manganese borate	$Mn_3B_4O_9$	1.617, 1.738, 1.776
cesium sulfate	$MnCs_2(SO_4)_2 \cdot 6H_2O$	1.4946, 1.4966, 1.5025
chloride	$MnCl_2 \cdot 4H_2O$	1.555, 1.575, 1.607
rubidium sulfate	$MnRb_2(SO_4)_2 \cdot 6H_2O$	1.4767, 1.4807, 1.4907
sulfate (ous)	$MnSO_4 \cdot 4H_2O$	1.508, 1.518, 1.522
	$MnSO_4 \cdot 5H_2O$	1.495, 1.508, 1.514
Mercury chloride (ic)	$HgCl_2$	1.725, 1.859, 1.965
cyanide (ic)	$Hg(CN)_2$	1.645, 1.492
iodide (ic) (red)	HgI_2	2.748, 2.455